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THE INDUCED INFLUENCE OF FOOD SWEETENERS ON CONCENTRATIONS OF FLAVIN-MONONUCLEOTIDES FROM NATURAL QUINCE JUICE

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ABSTRACT

Quince fruit juice obtained from fruits in a certified organic farming presents a series of sensory characteristics specific to a raw juice, with a harsh taste and slightly bitter with a smell of Quince. Improving sensory characteristics has been made added of this raw juice with certain natural sweetener (sugar, buckwheat honey, acacia honey).
In order to build a matrix that would provide the basis for the achievement of an electrochemical biosensor and to be able to track the falsification of this juice by adding sweeteners of synthesis were watched electrochemical signals issued by FMN and FAD coenzyme and cofactors in both cases.
The work represents a synthesis of the electrochemical studies of which result in large differences in concentrations of oxidized and reduced forms FMN from organic Quince juice plus a range of natural and synthetic sweeteners.

INTRODUCTION

In the last years, in Romania, organic farming has experienced a strong development; are becoming more and more in conversion organic operators or operators that are certificates- knew how to capitalize on the rich agricultural potential of Romania.

One of the greatest results produced by organic agriculture is the obtained quality for food as raw materials, raw materials that can develop the innocuous foods and functional foods.

To create added value in organic farming is necessary to ensure that the raw materials to be processed (respecting the working conditions of the system) [4, 5].
Because organic products creates some additional income for organic operators, appear a tendency as part of their produce to be forged and it is therefore very important that the study, on the added operation to allow and detect tampering. Therefore, scientific work has enabled the development of a method to allow then design an electrochemical analysis system-which can be used as an indicator of the extent of counterfeiting of organic products.

Specific objectives for this work paper consisted of:

-the operation of added of taste compounds under the same conditions of temperature, pressure for the assortment of organic Quince juice;

-checking the maximum absorbency zones and pick (where molecular absorption Spectra recorded a maximum) for FMN, FAD and $FADH_2$ oxidized fatty acids and other compounds from added Quince juice – conditions of the "based lines" of ecological juice unsweetened. It is used the method of addition of "Unique Add" using purified standards PA (pure analysis) for each of the compounds analyzed in the same conditions chemical "base lines";

-Elaboration of observations that results after the use of additives that are permitted by law -in areas which have maximum absorption Spectra [4];

Develop a study on the changes occurring in the organic Quince juice while you use the addition operation with the help of permitted additives for Romania, in order to obtain

refreshments juice with enhanced sensory features. We know the importance of these additives in their use in the construction of some organic food as well as the development of feed without nuisance [6].

MATERIALS AND METHODS

Quince juice was organic, made from Quince variety Beretki, technological maturity. Quinces were depelate (peeled), after which they were divided and passed through a juicer, BRAUN type, in order to get the raw juice of Quince.

From the raw juice of natural Quince, flesh was separated by a mechanical filtering operation and at atmospheric pressure, and through this process result the Quince juice[3].

The filtrate clear juice was diluted to a concentration of 3%, taking it up to the mark with double-water in a 500 mL volumetric flask, and this forms „the basis solution, ".

From „this basis solution", had taken as many 50 mL of solution and were introduced in 9 Berzelius cups. In these vesels were constitued the experimental variants:

V1 – ecological quince juice raw
V2 – ecological quince juice added with Sugar
V3 – ecological quince juice added with Honey (from Lime)
V4 – ecological quince juice added with Honey (from Acacia)
V5 – ecological quince juice added with Saccharine
V6 – ecological quince juice added with Cyclamate
V7 – ecological quince juice added with Aspartame (from Equal)
V8 – ecological quince juice added with Clio

Water used in switching, filtering and quantitative dilution, was in the category of deionised water and was obtained with the help of a modern type E-PURE WATER-PURIFICATION system HOLDER with cationic resins filters (for removing the positive ion load) and anionic resins (for removal of negative load) and which uses the principle of reverse osmosis. Final water conductivity was 0.003 μs/cm^3.

-the used Sugar was in the concentration of 4% and was the type Margaritar product by Agriana Romania S.A Company.

- The used Saccharin was produced by Sicomed S.A. and the concentration was 9. 5 mg/50 mL of quince juice.

-the used Lime-Honey was produced by Apys Prod LTD, the type of Dew the flowers, in concentration of 4%.

- the Acacia Honey has been produced of Naturalis SRL, the type Gold honey, 100% natural flavors without sugar or other ingredients, in a concentration of 4%.

-The used cyclamate (Edulciclam) is a synthetic diets sweetener, was produced by Gideon Richter Romania S.A. Târgu Mureş, and has been used in a concentration of 25 mg/50 mL of juice;

-the used sweetener aspartame (Equal) is a synthetic sweetener, is imported into Romania by Read International LTD, and in the study (current analysis) were used in the quantity of 45 mg of Equal/50 mL of juice;

- The used Clio is a synthetic sweetener, imported into Romania by Agrana, S.A. and has been used in to 40 mg/50 mL of juice. Clio contains both: 57.8% sodium cyclamate and 15.5% saccharine, both buffered with sodium bicarbonate and citric acid 13.7% monosodium 13.0%.

Samples were prepared for the conditions in which spectrophotometry were excluded intervention the interfering substances (to eliminate the errors of analysis) and under the same conditions of thermostat [3].

The spectroscopy of samples was done in the field of near UV (190-300nm), Visible domain (400-700nm) and near IR (700-1100nm), using a digital spectrophotometer,

width of 1 cm and that change the Deuterium lamp with Tungsten lamp at 325nm.

As the main equipment was used a molecular spectrophotometer of UV-VIS absorption type PG 92+, produced by PG Instruments, United Kingdom.

With this equipment have been measured concentrations of NAD and $NADH_2$ in the UV spectral domain (between 190 and 400 nm)[5].

RESULTS AND DISCUSSIONS

The main results obtained in this study are shown in the graphs below.

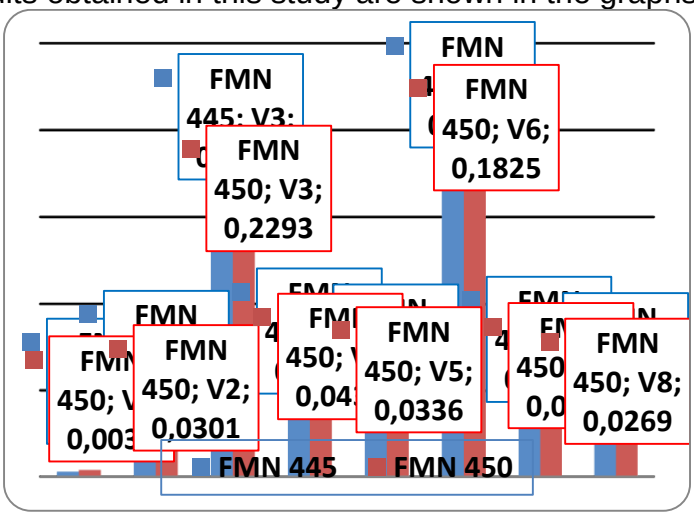

Figure 1-Total concentration of oxidized form of Flavin Mononucleotide

When use two substitutes-which are buffered with sodium bicarbonate-to improve the sensory characteristics of the Quince juice (V8) notice a strong decrease of the oxidized forms of the FMN and FAD. Working Media (organic Quince juice) is protected from the effect of these substances in the case of buffering.

Twice, the honey lime and cyclamate, after added in the organic Quince juice prove one other behavior – twice like true oxidants [1, 2]. The use of these substitutes gives a clear increase in the value of concentration of FMN oxidized forms (see the fig.1 and 2a).

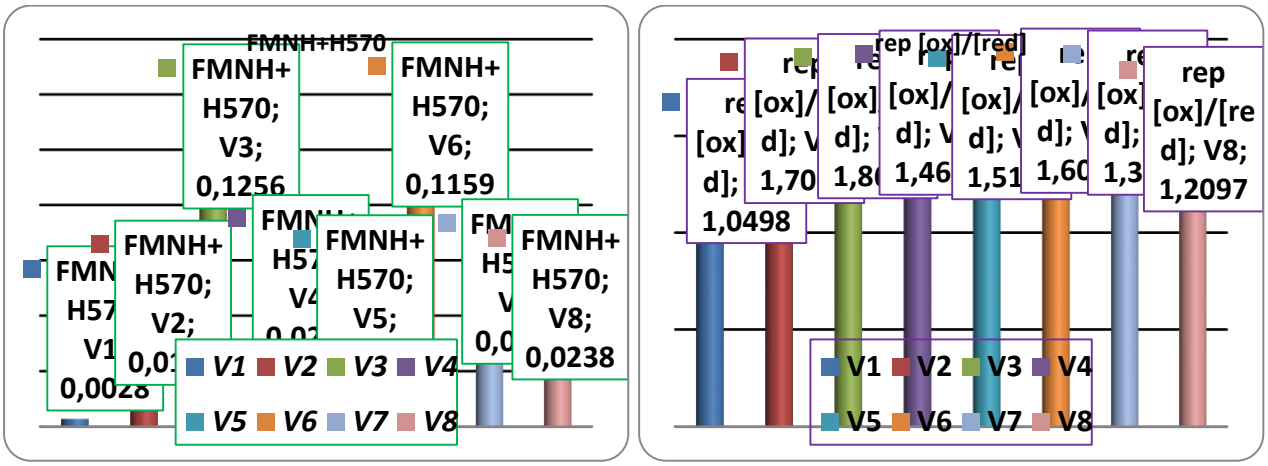

Figure 2-Concentration of reduced form of FMN (a) and report of concentration of oxidized/reduced form of FMN (b)

Use sugar leads to a decrease of the concentration of reduced forms of FMNH H and therefore increases the redox potential of the powerful environment, solving being performed in a fast rhythm (as can see in figures 2a and 2b).

CONCLUSIONS

-The Organic Agriculture is very important for Romania; it is an economic segment which is in a lot of spelling development and produce added value;

- In the European Union is given a special importance of organic agriculture sector growth-through the provisions of the Common Agricultural Policy, that the Ministry of Agriculture and Rural Development together with other Romanian authorities have a very important role in the development of economy in the Horizon of 2014-2020;

- Using the electrochemical elements (redox potential, *p*H, rH) and the molecular spectral analysis for the coenzyme, it can be a good matrix for electrochemical sensors;

- Using the electrochemical specific sensors it can be determined the originality of organic products and this aspect can contribute meaningful on health of consumers;

-Knowledge and application of the rules of organic farming leads to increase the added-value in agricultural products.

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